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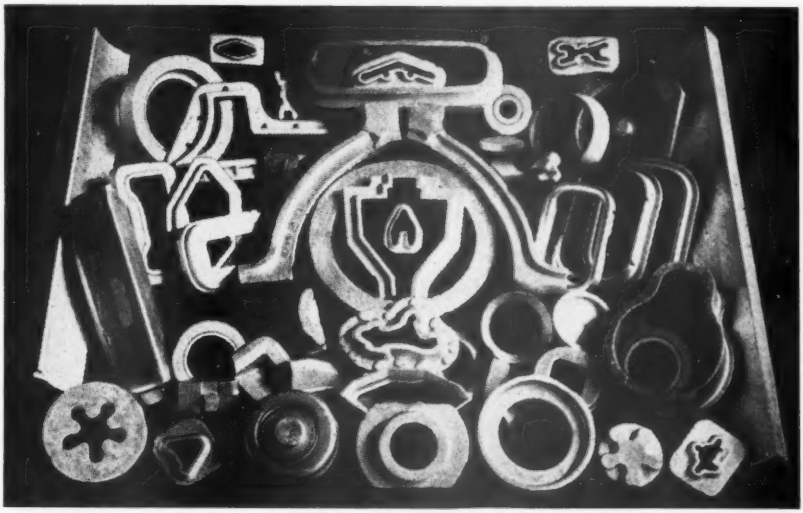

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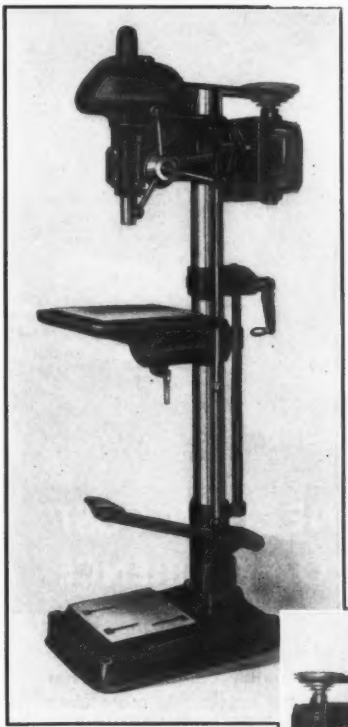
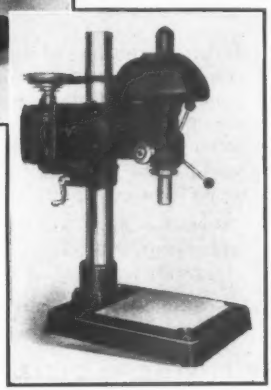


Model 18-C with production type, oil-groove table, foot feed, and table raising screw.



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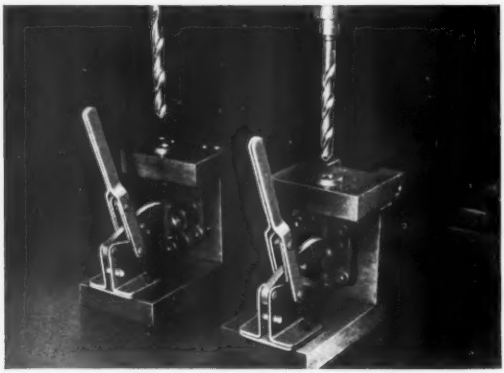

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Tool • Die • Machine **PROGRESS**

The National Tool and Die Journal

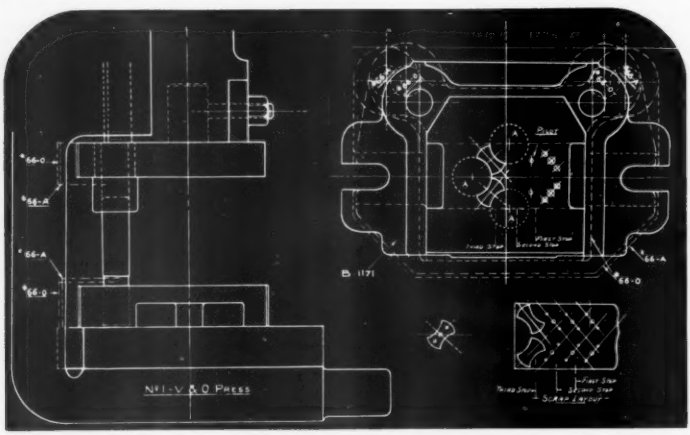
July, 1938 **Vol. 4, No. 4**

The Standardized Die Set Is An Important Factor In Modern Die Making

By P. H. Danly, Vice-President
Danly Machine Specialties, Inc., Chicago, Illinois

THE buyer of a specially designed tool or die measures its value by 1, the accuracy with which it performs the operation for which it is intended; 2, the period of its service without requiring renewal, or attention which holds up production. Thus it has been demonstrated many times that the first cost of a special tool or die is not the factor which determines its economy. In fact it is almost invariably true, particularly on long runs, that the opposite is true because when frequent reconditioning is required, during which time production must invariably be interrupted, product cost rises in proportion. Time and again the precision-built die, which may well be the most expensive in point of first cost, demonstrates its ultimate economy because it embodies that type of workmanship which assures perfection in its operation. Also its construction of the best materials and parts obtainable lengthens its service and extends its uninterrupted product production.

We illustrate herewith a die which punches and blanks rotor laminations from silicon strip steel progressively with a tolerance of plus or minus .0005".



This layout illustrates how and why this particular die set was selected with the use of the celluloid templet. Dotted outlines indicate two die sets which could not be used because of their wide post spreads.

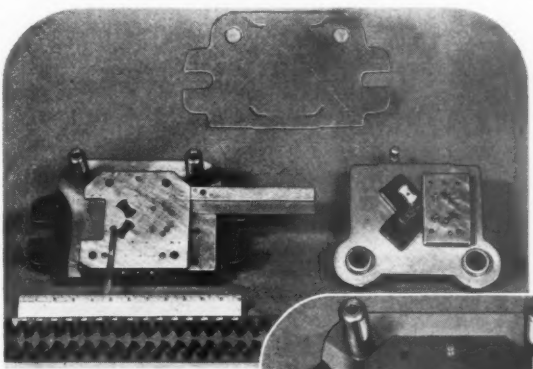
It was designed and built by Daco Inc., Long Island City, New York, mechanical engineers and builders of precision tools, dies and machines on contract. It was necessary to use ground insert plugs because the die was ground on all radii. These plugs were so made that they could be turned to new positions in the event of damage to cutting edges.

Even though only three ground plugs were used, it was found possible to produce 18,000 blanks per hour from the silicon strip steel. High carbon chrome alloy steel was used for the die parts and about 150,000 blanks were obtained before regrinding became necessary.

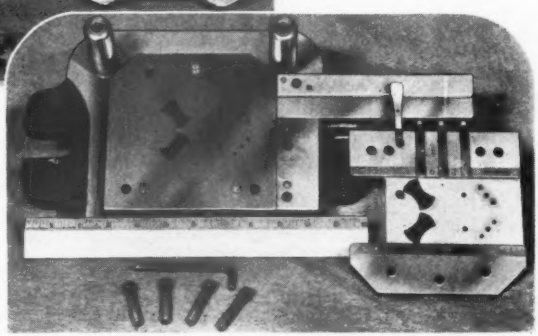
Because the user of such a die computes its value from its quality and length of service, the builder of the die must be certain that he includes those factors in his work. At the same time a die builder must also keep in mind that a profit must be realized from his work. A die set must be used which leaves no doubt as to the accurate and permanent alignment so necessary for a die which is required to operate within such extremely close product limits.

The die we are describing was to be used in a No. 1 V & O press. After determining the particular standard die set which would fit this press a celluloid templet was used to make the layout. These templets not only make it possible to quickly select the correct die set but they also reduce the time required for designing and layout. The convenience of using a celluloid templet for this particular die is well illustrated in the reproduction of the layout herewith. Note the dotted lines which indicate two die sets which could not be used because their wide post spreads interfered.

This particular die was to first appearances too large for the No. 1 V & O Press, therefore it was absolutely essential that the die set designated be unusually compact. The two views of the die illustrate this perfectly. The upper one of the finished punch and die with the stripper in place shows also a piece of the scrap silicon steel stock after the blanking operation. The celluloid templet is also shown. The lower of the two illustrations shows the stripper removed, exposing the die face and the inserted ground plugs. Standardized die sets such as that used in this instance contribute greatly to the profitable building and trouble-free use of all types of dies.



At the left, the finished punch and die with stripper and punch in place; also celluloid templet used in making the layout. Below is a strip of scrap silicon steel stock after it had been blanked.



At the right, the stripper has been removed to show the die face and the inserted ground plugs. The large available die space compared with the overall dimension of the die holder is evident.

Steels of Today and Tomorrow

A MOVEMENT to spur recovery is afoot in the form of a new exhibit known as "Steels of Today and Tomorrow." Two specialists in the field of alloy steels, Allegheny Steel Company and Ludlum Steel Company, are cooperating with the New York Museum of Science and Industry in presenting the exhibit at the Museum, Rockefeller Center. Its purpose is to show to the public the many new and expanding uses of steel and to forecast some of the expected developments that offer splendid opportunities for stimulating recovery.

At a preview for officers and invited guests, Hiland G. Batcheller, President of Ludlum, observed that in a U. S. Department of Commerce bulletin just released, steel production since 1885 shows the extraordinary average annual growth of 7.2% as compared with 4.3% in manufacturing generally, and 3.7% in the country's total production; while the country's population averaged an annual growth of only 1.9%.

Assuming, therefore, that the steel industry does offer one of the most important fields for stimulating recovery and reemployment, Mr. Batcheller stated that good business depends upon the equitable exchange of products and services which in turn, to a large degree, depends upon better mutual understanding between industry and the public.

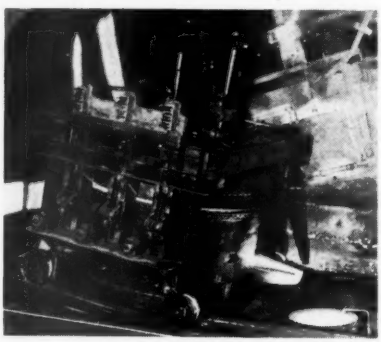
The sponsors hope, therefore, that the exhibit will result in a broader public appreciation of the vital part played in daily life by the steady advances of the metal working industry, and that it will also promote closer understanding and cooperation within the metal working industry and allied trades.

The sponsors expect to learn much of value from contact with the public at this exhibit, for it will be witnessed by thousands in every walk of life. It is also hoped that the exhibit will serve as an inspiration to the thousands of engineers, manufacturing executives, and others who are visiting New York City in connection with plans for their own exhibits at the World's Fair.

The exhibit shows not only the myriad uses of stainless steel but also new developments in tool, carbon, and alloy steels. It includes interesting demonstrations of fabricating and welding methods. Examples of steel in almost every form are shown—as raw materials, tools, machines, and finished products. Here the visitor may see how stainless and alloy steels are utilized in the interests of safety, health, beauty, better building, swifter transportation, increased production, more useful products of all kinds, and lower costs.

A natural color talking picture is in continuous operation as well as working models and demonstrations, many of which are operated by the spectators themselves by means of push buttons.

Of special interest, particularly to technical men, is a glimpse of new developments, some of which are hardly beyond the laboratory stage. An example in this category is Ludlum's revolutionary procedure of coloring stainless steel—not merely applied coloring but coloring which is in the steel itself and which has no adverse effect on stainless properties—color that ranges in fine gradations from a light yellow up to a slate grey which is so dark it is almost black.



Working model of electric furnace against a realistic background.

Nitralloy, stainless tubing and wire, Allegheny Metal and Allegheny's various silicon transformer steels are arranged in exhibits which emphatically bring home the fact that to the energy and far-sightedness of the steel industry must go much of the credit for cheaper power and smaller and more dependable equipment for homes.

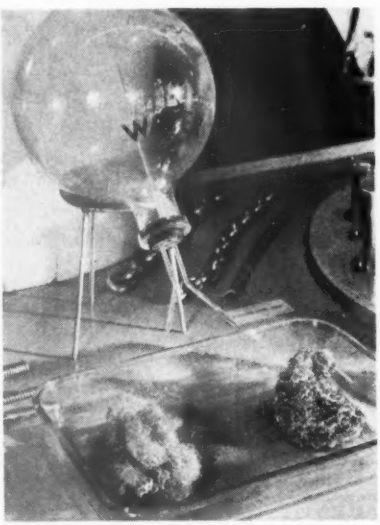
For the general public there are two major displays, partly animated, which forcibly emphasize the adaptability, convenience, sanitation, low cost and beauty of stainless steel in a multitude of home applications both inside and outside. These include Ludlum's new product Ludlite, the emphasis being on the ease with which this paper-thin stainless steel can be handled and the metamorphosis of a conventional kitchen or bathroom resulting from its judicious application.

Mr. Batcheller pointed out that steel has been a dynamic force in the progress of our nation and in raising the American standard of living far above that of any other nation in the world. He said that over 90,000 steel products such as the refrigerator, the telephone, the automobile, and power transmission equipment have contributed to these American standards; that approximately 500,000 men are normally employed in the industry at wage rates which in 1937 were 25% above 1929 and triple the average rate paid to steel workers in eight foreign countries; that the taxes paid by the industry in 1937 were equivalent to $330 for each worker employed and that the growth of the steel industry in America was not so much due to an abundance of raw materials as to an abundance of private enterprise, the essential alloy in human progress. He maintained that the real story of steel is not drab but is one of constant contribution to human values, as a creator of jobs, a provider of tax revenues, a promoter of invention, and that without productive enterprise there can be no wages, taxes, or security. The sponsors believe that it should interest most people to know there is a capital investment of approximately $11,500 in each of the 500,000 jobs in the steel industry—a monument to the individual initiative that has built the steel industry and that has developed the American standard of living.

Steels in many forms on attractive display.

The sponsors emphasized that the objective of the new exhibit is primarily that of functioning as a liaison force between the steel industry and the thinking public. To this end one entire section will be devoted to continuously changing exhibits by various manufacturers of consumer goods, regardless of their source of steel supply.

This special but constantly changing exhibit will continue as long as it serves the essential purpose for which it is intended.



Rust resistance demonstration, stainless vs. ordinary steel—one of the many graphic displays designed for laymen.

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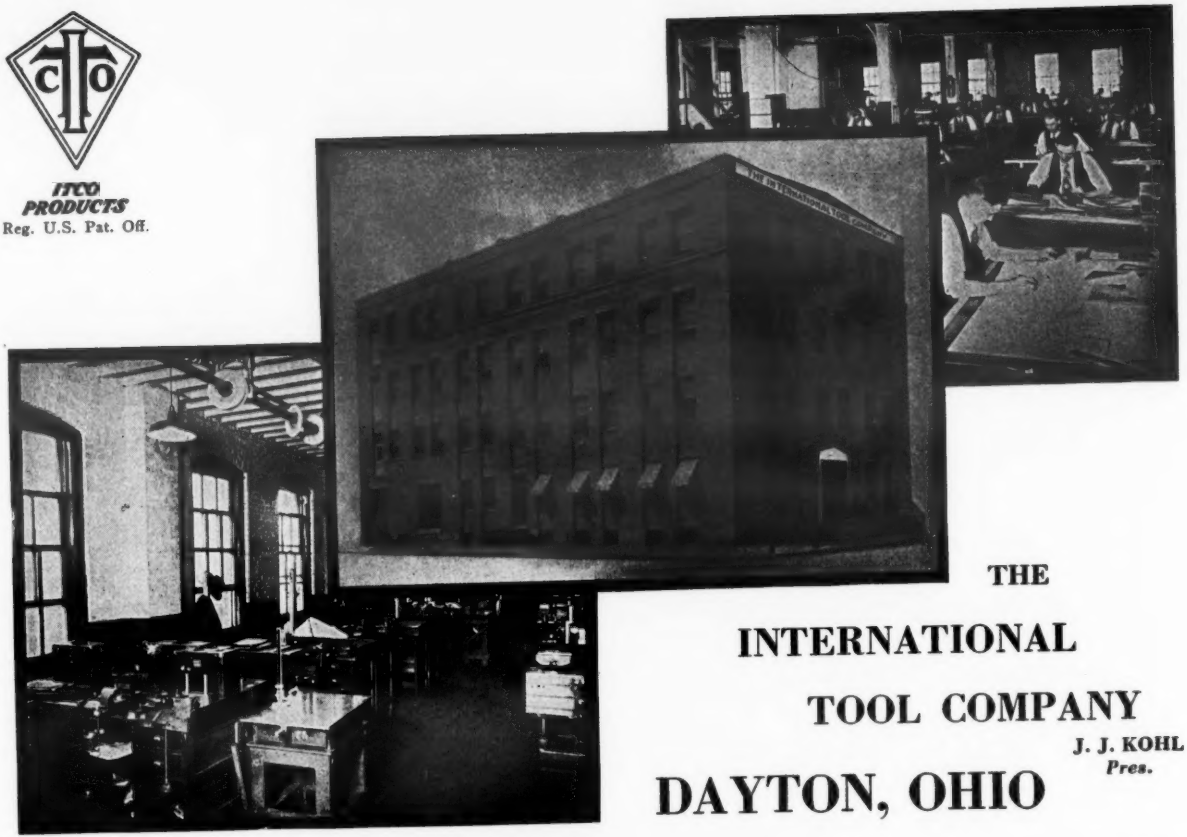

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Which Serve Industry Best . . . Large or Small Tool Shops?

By John L. Lyons, M. E.
Lyons Machine Company
Cleveland, Ohio

THE trend of modern production manufacturing has for ten years or longer been unmistakably toward the use of more special tooling and specially designed machinery. The reasons are obvious.

Most products and articles of manufacture now-a-days must have eye appeal; lines and contours must be pleasing. Competition sees to it that lines change. They move in trends and fashions almost like the styles in women's hats and dresses.

The automobile is perhaps the most outstanding example of elaborate changes from year to year and there is very little doubt but that this process of annual model changes, each accentuating newer, more modern lines, has through the years aroused in many individuals and families a recurring desire to own the latest.

But there are dozens of other products of industry which have found it highly profitable to follow in the "footsteps" of the automobile. The motor bus, truck and trailer; the new gas stoves and electric ranges, the modern refrigerators, in fact, every kind of household appliance is very different today than it was a few years ago; and even your children's toys are examples of the modern tendency.

New designs, new models almost invariably mean new dies for forming and drawing new contours. Mechanical changes require new tools, jigs, fixtures, gages and other precision specialties. Always there are being devised better methods of fabricating, processing and assembly, for which the special machine has become a necessity. It has contributed tremendously to reducing the cost not only of the individual operation but of the ultimate finished product.

These new trends of industry have caused some manufacturers to build large tool and die shops of their own. There are no doubt advantages in this procedure but there are also disadvantages which in most instances assume the dominant position. The toolroom has always been a prime requisite in every manufacturing plant but its expansion to the point where it can completely fulfill the *special* tooling requirements of the plant which it serves is hardly practical from the economic standpoint.

Among the advantages of such large special tool and die building facilities may be: The large quantities of tools which can be built; the speed with which a large tooling program can be completed; the immediate availability of these tool making facilities. The necessity for tool and die maintenance may also provide a reason for toolroom facilities but a capacity sufficient for handling the large special tooling programs is not required for this. Another reason sometimes advanced for larger toolroom facilities is that experimental work requires secrecy, but here again it may be pointed out that usually that type of work does not demand particularly large facilities.

The disadvantages of over-expanded tool and die making facilities are really quite apparent. Equipment for tool and die building is expensive and frequently it occupies building space which could

be readily utilized for more profitable activities. Tooling for new models is at best a seasonal activity. If it requires only three months to complete a program then there are nine months of reduced operating for many of the expensive machine tools and other equipment in that toolroom. Even if it requires six months there are still another six months with which to reckon. The largest manufacturer does not have a continuous flow of tool work in quantities which justify peak toolroom capacity.

Sporadic operation of any industrial unit causes uncertainty of employment for labor. It is one of the problems of our day. Under recently enacted legislation large employers of labor are really penalized when their turnovers are frequent. This is accentuated in the case of skilled workers in a toolroom because they are usually among the better paid mechanics.

The building of tools and dies is one line of business which can be unprofitable if a shop or department becomes too large. Supervision and inspection are two prime requisites in tool making and both of them are, in the final analysis, overhead. They can easily become overbalanced. Here the argument is sometimes heard that the cost of a special tooling program is properly chargeable to the product for which it is intended. That is probably true but an expenditure beyond what is necessary for a comparable product is never justified in good business management. Also, it can happen that if the new product for which the special tooling is intended does not sell in such volume as was anticipated, the cost of the tooling can be a very considerable factor, perhaps even determining whether or not there will be a profit.

It is only about a century ago when a manufacturer who wanted to manufacture a new product had to design and build his own machines, taps, cutters and tools. Through the years, however, these have become standard products. Within the last few years, comparatively, the demand for special tooling—Tools, Dies, Jigs, Fixtures, Molds, Gages, Machines and other Precision Specialties—has firmly established another industry. These TDM Contract Shops are set up

(Continued on page 28)

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STANDARDIZED

Drill Jig Bushings

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Leader Pins and Bushings

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Dowel Pins

Send for Complete Catalog or Specific Data Sheets

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We also Specialize in Complete Machine Part Manufacture Requiring Extremely Close Limits, Lapped Fits, etc., for Pressures up to 15,000 lbs. per Square Inch.

ACME INDUSTRIAL CO.

206 No. Laflin St., Chicago, Ill.

When you order or write about products described in TDM PROGRESS please mention the publication.

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SPURS
SPIRALS
BEVELS
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High Precision or commercial Production—a few pieces or a million.

SPIRAL GEARS like these can "go haywire in a hurry" if they are not '*right*' . . . Being *right* or *wrong* is the big difference between being IN or OUT of the 'know-how'. Buy *yours* from SPECIALISTS such as—

Made to order ONLY—*No stock—No catalog*

Gear Specialties
INCORPORATED
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We carry in stock a complete line of water and oil hardening *Tool Steel* for forging into *Rings, Discs and Special Shapes.*

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We specialize in *Composite Steel Forgings*—tool steel welded to soft steel in various shapes and sizes.

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We have in stock both hard and soft *Copper* which we forge to order into *Rings, Discs and Special Shapes.*

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Complete stock of Machine and Alloy Steel.

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Composite Die Forgings in Cleveland since 1917.

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When you order or write about products described in TDM PROGRESS please mention the publication.

Gage Block Reconditioning Service Extended

THE Ford Motor Company, Johansson Division, announces the extension of its gage block reconditioning service to include for the first time gage blocks of 2, 3 and 4 inch sizes.

This reconditioning service has heretofore been available only on 5-inch blocks or larger. By means of a secret process used by the Johansson Division, gage blocks which have become worn to the extent of affecting their accuracy can be reconditioned and guaranteed to be within their original accuracy.

The Johansson reconditioning service is combined with the regular inspection service and it is possible, therefore, to recondition blocks which may require it and return them to owners in about a week.

New Officers Elected By Dayton Group

AT the annual meeting of the Tool Manufacturers' Association of Dayton, Ohio, a division of the Special Tool, Die and Machine Shop Institute, new trustees elected were J. J. Kohl, International Tool Company; W. M. Haben, Norwood Engineering Company, both elected for two years, and Charles Brinkman of Brinkman Engineering Company for one year. All are from Dayton. With George Capliski of Eureka Tool and Die Company, Dayton, and H. C. Murrer of Modern Tool Company, Cincinnati, they comprise the Board of Trustees. The election of officers which took place at the first meeting of the new board resulted in the election of W. M. Haben, president, J. J. Kohl, vice president and George J. Capliski, treasurer.

ACCURACY
0.1007"
0.1007"
0.1008"
FOR SALE
Johansson Gage Blocks, differing in size by .00005 in. and accurate to ± .000008 in., cost as low as $3.50. 174 blocks, ranging in size from .010 to 20.000 in., are sold individually. Sets in cases range in size from 5 blocks to 81 blocks. Johansson also makes a variety of accessories which greatly increase the usefulness of the blocks. The prices are so low that no shop can afford to be without these means to supreme accuracy. They are pillars of precision on which modern industry depends —priced within reach of every machinist. Catalog No. 12 contains full information. Write Dept. H.
Johansson ACCURACY
FORD MOTOR COMPANY
JOHANSSON DIVISION
DEARBORN MICHIGAN
5 100,000 IN. FOR $3.50!

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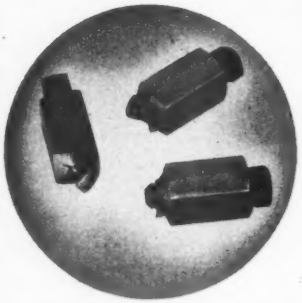
LET *MAC-ITS* SAVE YOU THE COST OF BROKEN SCREWS



YOU CAN drive a ⅜" Mac-it square head set screw through a steel block. Try it yourself. Send for a block-buster prover set!

Why waste valuable time drilling out broken screws? Or take chances on ruining expensive machinery? From socket head screws to tool post screws and milled studs, Mac-it offers you 16 alloy steel screw products that stand the most severe service!

Where can Mac-its save YOU money? Write for brand-new Catalog 3813 today, and decide for yourself!

The Strong, Carlisle & Hammond Co.
1392 West Third St., Cleveland, O.

Mac-its PRONOUNCED "MACK-ITS" THE ONLY COMPLETE LINE OF HEAT-TREATED, ALLOY SCREWS

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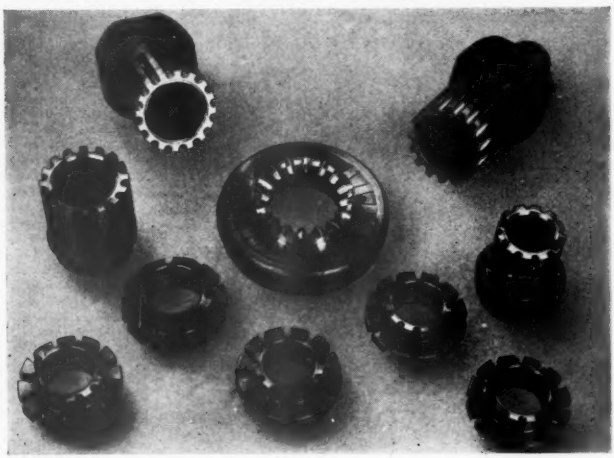

PERFECT CONTOUR GRINDING JOB

We have specially developed facilities for difficult precision grinding in the building of Special Tools . . . Stamping and Coining Dies . . . Contour Rolls.

LINCOLN TOOL AND DIE COMPANY

Designers and Builders 950 West Fort St., Detroit, Mich.

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Die Designing and Estimating

By CHARLES BOHMER

This sixth article continues the series on "Tool Designing and Estimating" as this subject is being taught to Tool and Die Shop apprentices under the auspices of the Chicago District of the Tool·Die·Machine Shop Institute in the Carl Schurz High School. The author, Charles Bohmer, tool superintendent of the Federal Tool Corporation, is one of the class instructors.

Cut-off Dies

CUT-OFF or parting dies come under two classifications, one constructed in such manner that parting takes place by cutting out a portion of the material, thus causing the separation, and the other constructed to cut off by severing or shearing the material.

The type of die to be used depends entirely upon the kind of blank or part required. Briefly the determining factor seems to be the contour of the sheared part at its point of cut-off; that is, is it irregular in contour, radius, curve or notch; or is it concave or convex; or is it a straight cut.

Cut-off dies are particularly suited to the stamping operation which does not embrace complete contour blanking nor require extreme accuracy. The material to be used is prepared by being sheared to the proper width and then merely cut to length and shaped according to specifications. The process results in considerable saving in tool cost.

CUT-OFF DIE (with scraps)

The component parts of this type of construction are the die block or blocks, punch, stripper, gages, stop and in some instances perforators and pilots.

As stated previously, dies of this type remove or cut out part of the material and cause separation in this manner, therefore it is necessary to have a die opening and punch to accomplish this. The die block may be either of the solid or split construction, and the opening machined to suit the contour of the end of the stamping, its width determining the amount of scrap which should be in such proportion that sufficient strength is maintained in the punch for efficient operation. This width is the distance between the closest edges of the dies and varies according to stock thickness, however, it is seldom less than $\frac{1}{32}$".

The die opening must have the proper draft or taper to permit the scrap to drop through, and, in general, all principles of blanking dies must be followed. One precaution must be taken, that is, the shape or size of the opening must include correct clearance between punch and die for clean, burrless cuts. Should perforators be necessary, the openings for them may be put directly into the die block or the bushing type of construction used, depending on the quality of the tool and the size of the perforations.

In the case of perforations on each end of the part, it has been found advisable to place them on both sides of the die opening; this permits adjustment of center distance and eliminates needless waste of die material. It can readily be seen that if perforation takes place before the cut-off there is no possibility of adjusting or changing without alteration of the die itself, while on the other hand changes of center distance may be made by merely moving the stop.

The punch is machined to suit the opening and other specifications are

those of the base or pad principle. In the base type of punch the base is usually the perforator-retainer, the openings being accurately bored or drilled and then lapped or ground. In some cases the base is left soft and the holes machined-in after the hardening treatment has taken place.

The back and front gages are mounted to the stripper and the complete assembly in turn mounted to the die block. They are usually all made of cold drawn steel and are of the same types as in the other type of cutting dies discussed previously. The back gage extends beyond the ends of the block and to it are fastened the stop and material rest, the stop being of either an adjustable or stationary construction, depending upon the purpose of the die. An important point is to have sufficient clearance or spacing in the stripper to permit easy removal of the part.

When the cutting-off takes place, there is an extreme tendency for the material to jump away from the punch and if the perforators are shorter, punch inaccuracy between end and hole center may occur. In stamping thin material, this condition may easily be eliminated by making the perforators longer than the cut-off, but in the heavier materials where there is danger of perforator breakage because of extreme side pressure, this condition may be avoided by inserting a strong pusher pin arrangement which forces the material against the back gage, holding it in proper position. This principle is also advisable in overcoming possible difficulties of holding the material against the back gage for proper guidance.

The parts are all properly mounted on a die set with all principles of correct mounting and careful alignment taken into consideration.

CUT-OFF DIE (no scrap)

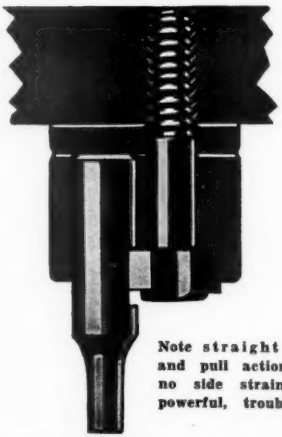
This type of die is composed of parts similar to the above, and is used for stampings of square or coinciding ends. There is no waste of material and it is a desirable construction whenever conditions permit its use.

Cutting-off takes place on one end of the die block and is accomplished by the

(Continued on page 23)

NO SPRINGS! NO GADGETS!

on the Hovis Punch Retainer



Note straight thrust and pull action with no side strain—sure, powerful, trouble-free.

The Hovis Screwlock method for retaining punches is so simple that its advantages are obvious:

Positive Interchangeability and Quickest Replacement of Punches . . . Partial turn of Screwlock with standard socket wrench *really* releases punch.

The New Hovis Square Hardened Retainer is ideal for *close grouping.* With punch close to one corner, it has all advantages of both square and end type retainers . . . For *compound dies,* it permits punch mounting close to die sections.

• • •

A Hovis Record

Progressive die with Screwlock Retainers and Punches delivered 12,000,000 stampings from 13 gauge steel.

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It will pay you to investigate and send for catalog . . . We make all kinds of punches.

HOVIS SCREWLOCK CO.
3129 Larned St., East Detroit, Mich.

Representatives

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1438 N. 13th St., Philadelphia, Pa. Phone - STE 4658

Wisconsin - Lee Eckelman
4417 W. North Ave., Milwaukee, Wis.
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(Continued from page 22)

shearing action of two edges, one on the block and the other on the punch. Due to this shear-cut there is a great deal of side pressure exerted on both punch and die, therefore the necessary steps to prevent their moving must be taken. Should perforations be necessary they must precede the cut-off, therefore all perforators are placed on the front or feed end.

Both punch and die are usually square or rectangular blocks centrally mounted on the die set. The stripper gages and stop are mounted on the die block with sufficient clearance to remove the part. In the perforation construction, pilots are necessary in the punch and must be provided for. Because of the action of the cut-off the part has a tendency to bend down slightly when the punch contacts the material, causing the end to become out of square with the face of the blank. To prevent this a spring pad may be placed next to the die and it should be of such construction and so located as to eliminate the initial bending. This is necessary only in the heavier materials.

Since there is tremendous side and cutting pressure when heavy stock is cut, it is advisable to put shear on the punch. This shear must run from side to side, parallel to the cut edge, to prevent distortion of the part. One thing to remember is that the punch does not have to equal the entire length of the blank as long as there is sufficient strength and length to accomplish the cut-off and prevent moving.

Again all principles of mounting and alignment hold true with the one exception of no clearance between the cutting edges other than for heavy materials.

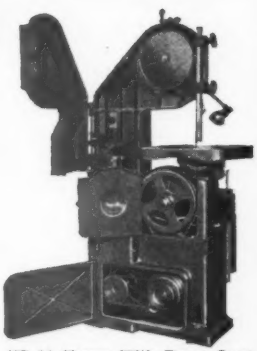
Saves Hours of Set-up Time
•
Accurate to Precision Limits

The MAGNA-SINE
A Magnetic Sine Table Adjustable to ANY DESIRED GRINDING POSITION
OMER E. ROBBINS COMPANY
637 Mt. Elliott Ave. Detroit, Mich.

MODERN DIE-MAKING MACHINES

YOU'LL BE INTERESTED IN THIS IMPROVED GROB METAL BAND SAW

Model NS 14



NS 14 Shown With Doors Open

Improved in efficiency and performance, this new Metal Band Saw has an overflowing measure of new refinements and operating features . . . scientifically designed saw guides assuring faster cutting and longer life to the saw blade, four way tilt table, five speeds, automatic table feed with oil dash pot, etc. . . . improvements that will mean perfect dies at lower costs. **Write for detailed catalog** giving full information on above as well as on continuous motion filing machines and Open End Band Saws.

GROB BROTHERS
GRAFTON, WISCONSIN

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Van Norman Takes Over Producto-matic Line

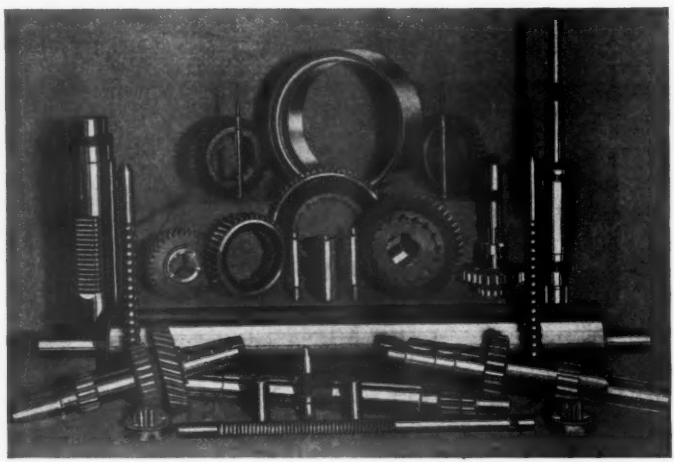
PURCHASE of the machine tool business of the Producto Machine Company, Bridgeport, Connecticut, was recently announced by the Van Norman Machine Tool Co., Springfield, Massachusetts. An addition to the main Van Norman plant at Springfield to house the manufacture of Producto machines has already been started.

The Producto-matic line includes crank shaft mills, cam type millers, heavy production mills, bed type manufacturing mills, as well as smaller knee type manufacturing machines. The latest addition to this line is the No. 10 Hydro-Cam Contour Mill, several of which have been sold to the large aircraft companies for propeller and connecting rod work.

The manufacture of die sets and fine grey iron castings will be continued by the Producto Machine Company in Bridgeport. They will also service the older type of machines previously manufactured by them.

The Van Norman Company has appointed Mr. Edwin L. Larson to the position of Assistant Sales Manager of the Machine Tool Division. Mr. Larson is particularly well fitted to aid manufacturers in their choice of machine tools, having been formerly Chief Engineer of the Baush Machine Tool Company, and for the past two and one-half years associated with the Van Norman Engineering Department.

HARD CHROME *for* LONGER LIFE



- New and salvage work on gauges, dies and machine parts.
- Ask for interesting 16 page catalog or to have representative call.

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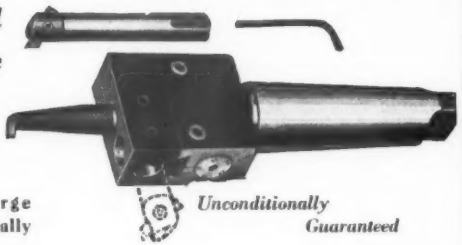
SMALL SIZE *but* BIG PERFORMANCE

The compact design and rigid construction of the

MASTUR PRECISION BORING HEAD



combined with its exceptionally large boring capacity make it an unusually satisfactory tool. *We guarantee it . . . You be the judge in your own shop.*

Perfect adjustment—direct reading in 1000ths; vernier reading in 2/10 of a 1000th. Every working part adjustable for wear.

Unconditionally Guaranteed

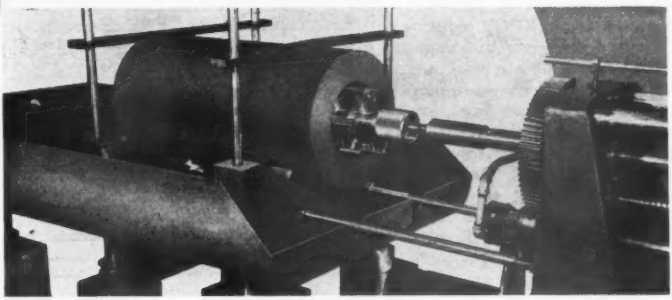
3 SIZES

No. 5—Boring Capacity 7"----$37.50
No. 6—Boring Capacity 11"---- 65.00
No. 7—Boring Capacity 15"---- 90.00

Send for descriptive circular or order confidently direct from this advertisement

THE F. A. MAXWELL COMPANY
310 Broadway BEDFORD, OHIO

INVESTIGATE THIS NEW PERFECT HONING SERVICE



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Honing a hole 8¼" in diameter and 37" long in a forged alloy steel cylinder—S.A.E. 3140, Brinell hardness .534.

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The development of the new Enterprise Horizontal Honing Machine enables us to offer manufacturers a honing service which effects savings over both precision grinding and other honing methods.
Honing, as it is done on the new Enterprise machine, assures the accuracy and fine finish obtained from lapping, but its cost is much less. It is really "lapping on a production basis."

The machine is particularly efficient for honing holes of 3" to 12" diameter in cylinders and other products as long as 5 feet. *Let us submit proposals.*

OUR MACHINE REBUILDING SERVICE

is unexcelled. We maintain a large stock of production machine repair parts. Catalog on request.

ENTERPRISE MACHINE PARTS CORPORATION
Jerome Avenue at McNichols Road -:- DETROIT, MICHIGAN

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New Catalog of FCC's Products and Services

THE Forging and Casting Corporation's new catalog is profusely illustrated with photographs of the company's standard and special products. Included are descriptions of smooth hammered forgings of all kinds in sizes up to 6000 pounds; composite steel die sections; nitri-cast-iron; air and oil hardening tool steel cast to shape; air hardening welding rod and No. 17 metal resistance grids for rheostats.

The standard types of forged shapes—rings, discs, blocks, bars and blanks for hobs and cutters, also numerous special shapes are illustrated. Two special steels have been developed respectively for zinc and aluminum die casting dies.

Two kinds of composite steel die sections are described—the electrically welded and rolled. A choice of fine tool steels to be used for the cutting edges is available and both standard and special sections are illustrated and described individually as well as shown assembled as complete dies. The advantages of these composite sections with their tool steel cutting edges welded to mild steel bases are explained in detail.

An important part of FCC's operations include tool steels cast to shape. FCC's tool steels for this purpose are manufactured in electric furnaces under laboratory control and all castings are annealed in automatically controlled furnaces. Both air and oil hardening as well as alloy tool steels are available. It is pointed out that by this method of casting to shape, die parts are delivered in a form which requires that only ⅛" be machined off, thus considerably reducing the time required for fabricating.

It is pointed out that casting tool steel to shape is advantageous not only in the building of punches and dies but also for bushings, cams, gages, guides, hobs, mandrels, rolls, swedges, tools for burnishing, knurling and spinning; end rings for printing presses and many of the wearing parts of machines.

Nitri-cast-iron, a chromium, aluminum, molybdenum iron is described as a modern answer to abrasion. Illustrated and described are an engine cylinder block with nitri-cast-iron inserted sleeves, machine draw heads for fine wire drawing, slip rings for a wire drawing machine and pump bodies. Castings are made in sand molds, permanent molds or by the centrifugal process.

This catalog should be unusually valuable to builders of tools, dies and machines as well as to manufacturers whose products require special tooling or incorporating parts which FCC materials or processes might produce more economically.

Please write The Forging and Casting Corporation, Ferndale, Detroit, Michigan, for catalog CL38.

HAVE YOUR DIES WELDED
BY THE ATOMIC-HYDROGEN PROCESS

- Welding of Jigs and Fixtures
- Repairing and Refacing of Dies and Moulds
- Welding Broken Machine Parts
- Stellite or Alloy Facing of Wearing Parts
- Mishaps and Errors Corrected

ALL DIE WELDING DONE WITH STEEL OF SAME ANALYSIS AS YOUR DIE

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1617 West 116th St. LAkewood 3640
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CARING FOR TOOLS *Pays!*

Systematic Care of tools pays the employer in increased production. The men will do more work and do it more easily when they care for their tools in a of particular men

Gerstner Chest. The choice for 30 years. *Free Catalog.*

GERSTNER TOOL CHESTS
56 Columbia St., Dayton, Ohio

ALLOY
HY-TEN
STEELS

Immediate Shipment from Six Warehouses

ALLOY
S. A. E.
STEELS

Reduce your tool and die costs with *Hy-ten "M" Temper, .70 Carbon Cr-Ni-Moly* oil hardening alloy steel. Extreme toughness at high degrees of hardness. Rounds, squares and flats in stock. Forgings of all types.

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WHEELOCK, LOVEJOY & CO., INC.

CAMBRIDGE CLEVELAND CHICAGO NEWARK DETROIT BUFFALO

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BARTH STAMPING & MACH. WORKS
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DIES—TOOLS—JIGS—MOLDS
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JIGS—FIXTURES—GAGES—MODELS
Blanking, Forming, Drawing, Piercing
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Special Tools and Machinery

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Designers and Builders
Jigs & Fixtures Special Machines
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COMPLETE PLANT ROUTING and TOOLING

***THE DENNING MANUFACTURING COMPANY**
1775-81 East 87th St. CEdar 0801
Designers and Builders
HIGH GRADE DIES

HAHN MANUFACTURING COMPANY
5332 Hamilton Ave. ENdicott 2205
Modern equipped shop for building of
MEDIUM AND LARGE
DIES, TOOLS, SPECIAL MACHINERY
Equipment includes:
3" and 5" spindle Horizontal Boring Mills
Large planers Vertical Mill

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1436 East 47th Street Founded in 1903
Builders of Special Machinery
GENERAL MACHINE WORK

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Manufacturers Special Machinery
Tools, Jigs, Fixtures *Tungsten Carbide Tools*
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Tools and Dies *Special Machinery*
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SHEET METAL DIES, TOOLS, SPECIAL MACHINERY, DIE CASTING DIES
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Modern Facilities
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JIGS, FIXTURES, DIES
Experimental Work

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Which Serves Industry Best..

(Continued from page 17)

to build in the most economical manner possible all kinds of *special* tools, dies and machines required by the production industries. Each draws his business not only from several such manufacturers but also in most instances from different industries, thus, in contrast with the individual toolroom, there can be more continuous operation and more uniform employment of labor, both so necessary for profitable shop operation.

Designing and building special tools and dies is not a business comparable to production and cannot ordinarily be handled as such. Economy of operation comes not from quantity production but as the result of machining, fitting and assembling correctly the *first time* the numerous parts of which a tool, die or machine is built. There is much detail, and always mathematical accuracy is required. This calls for continuous supervision and it can be provided in a small shop much more economically and with far greater assurance of good results than in a large one.

Being a contract shop operator, I thoroughly subscribe to the argument that the best of work is done in these shops. It is my experience that it *must* be good work because a tool, die or machine designed and built, or perhaps only built from the customer's prints and specifications by a TDM Contract Shop, usually must carry a guarantee of successful operation. And what is of vital importance to the shop owner is that it must also show him a profit. These TDM Contract Shops have indeed contributed substantially to reducing the cost of the special tooling which most production manufacturers require to compete successfully.

CLEVELAND Tool · Die · Machine CONTRACT SHOPS

The PHOENIX ICE MACHINE COMPANY
2711 Church Ave. CHerry 1048
GRINDERS
12" by 100" Cylinder
16" by 36" Surface
Let us figure

A. P. SCHRANER & COMPANY
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EXTERNAL CYLINDRICAL LAPPING MACHINES
Special Machinery
TOOLS, DIES, JIGS, FIXTURES

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STAR MACHINE & TOOL CO.
Established 1903
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DIES - JIGS - FIXTURES
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JIG BORING with
Pratt & Whitney Precision Equipment
NEW OPENSIDE PLANER EQUIPMENT
12 ft. x 48" Capacity

TOOLS & GAGES, Inc.
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"Let us be your tool room."
DESIGNERS AND BUILDERS
Tools, Gages, Dies, Jigs, Fixtures
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SWISS JIG BORING
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Special Machinery *Designing and Building*
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Designers and Manufacturers
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Manufacturers and Engineers
Dies, Jigs, Fixtures, Gages
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Hamilton, Ohio

***THE HAMILTON TOOL COMPANY**
220-222 North B Street
Designers and Builders of
Tools, Dies, Jigs, Fixtures, Special Machinery
The Hamilton Portable Elevating Table

*See larger display advertisement also.

When you order or write about products described in TDM PROGRESS please mention the publication.

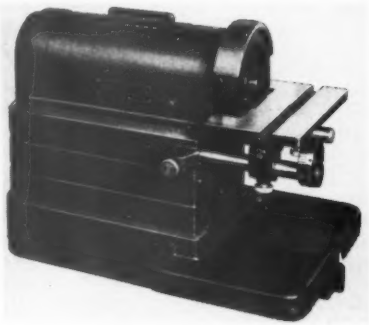
Ex-Cell-O Adds New Low Price Carbide Tool Grinder

A NEW carbide tool grinder to sell at a low price is announced by the Ex-Cell-O Corporation. The price should enable comparatively small users of carbide tipped tools to realize the advantages of being able to grind these tools in their own shops. Also in plants where such tools are used extensively it will be economical to place grinders nearer to production machines, thus eliminating much of the time required for taking tools to a central department for sharpening.

Although the price of the new grinder is $125.00 complete, its design and construction follow the best accepted practices for higher priced grinders. Among the features employed are wet grinding with diamond impregnated wheels which assure faster and more accurate grinding with longer tool life as a result.

The new grinder is constructed as a single-end, self-contained motor driven machine with a ball bearing spindle and a built-in coolant reservoir. It has a completely adjustable table and angle-setting dial and protractor to make it possible to grind readily the sides, radii and angles of round and rectangular right and left hand tools.

The dial has graduations which are clearly visible to the operator without stooping, enabling the operator to set the tool rest table accurately so that any angle from 90 to 115 degrees between it and the wheel face may be readily obtained. The table, which is mounted across the face of the wheel,



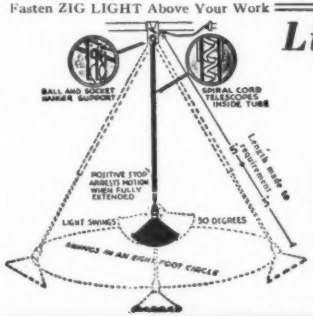
has a slot for guiding the protractor, which is also graduated in degrees. The distance from the table to the wheel is adjustable.

The spindle is journalled in ball bearings at both front and back and is driven by a V belt from an electric motor which is adjustable and mounted inside the machine base. The lifting of a guard at the back of the machine makes belt replacement and tension adjustment easy.

The approximate weight of the new grinder is 135 pounds and it has an overall height of 14¾ inches, a width of 13½ inches and it is 20⅝" in depth. The electric motor is ¼ HP, operates on 110 volts, 50 or 60 cycles, and develops 1725 R.P.M.

For further details write Ex-Cell-O Corpn., 1200 Oakman Blvd., Detroit.

Fasten ZIG LIGHT Above Your Work



Light WHERE YOU NEED IT!

From the top, from the side; close to the work or with wide coverage. Always without glare.

THE ZIG LIGHT
(PATENTED)

A movable light which "stays put" wherever you need it. Push it up, pull it down, swing it out, swing it completely around on an 8-foot diameter. It's there when you need it, out of the way when you don't. Use it anywhere—over machines, benches and drafting boards; over typewriters and files; in stockrooms. Lengths 3 to 10 feet.

Prices $6.50 to $8.50 with discounts on 3 or more.

FULLY GUARANTEED — RETURNABLE AT OUR EXPENSE. Order from this ad with confidence of satisfaction or write Dept. CL for further details.

J. ZAGORA MACHINE & GEAR CO.
1329 S. Mint Street Charlotte, N. C.

When you order or write about products described in TDM PROGRESS please mention the publication.

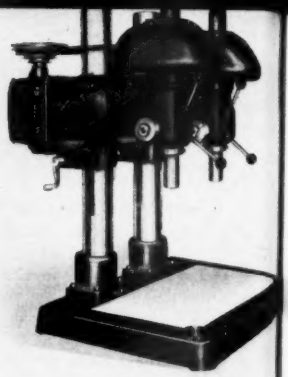
New Low-Priced Line of Power Drills

CONVINCED that there is need for a moderately priced, accurate and powerful drilling machine, the Buffalo Forge Company has developed and now offers its Number "18" line. Completely new and with distinctive economy features it is nevertheless pointed out that it has no "sales appeal" gadgets, no nickel plate and no red enamel, but it does have a chrome-nickel alloy spindle, .9375" diameter capable of drilling 1" in cast iron, a large, heavy column, and large and accurate working surfaces. The spindle bearings and spindle sleeve bearing are fully adjustable to add to the long, accurate life of the drill.

More than two years of experimental work have preceded this announcement. The No. 18 Drill is a finished machine in every respect. The minor changes common to most new models have been made, thus there will be no occasion for revision of design.

Realizing that there are a great many different ideas of what constitutes the ideal arrangement of table, feed, etc., this concern tabulated the preferences expressed and found that they fell into easily recognized groups. For this reason, the No. 18 Drill is available in eighteen models; a line-up which will enable the most exacting buyer to obtain whatever arrangement is desired.

The head frame is large and heavy and is split in front with adjustment for wear of the spindle sleeve bearing. This insures accuracy throughout the life of the machine. The table and base are of extra heavy proportions and have large working surfaces. The production table and production bench base are smooth while the standard table and base are slotted for T-bolts.



2-speed bench type drill with head-raising device

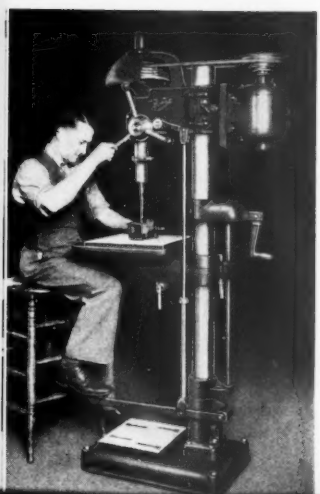
The nickel alloy steel multiple spline spindle is ground and polished and perfectly balanced. It rotates in two precision type ball bearings, the lower one being a double row bearing to take the thrust of large drills. The bearings are sealed to prevent the entrance of dust and the loss of lubricant. The spindle sleeve has the rack cut integral and slides in an exceptionally long bearing in the head. Provision is made for adjustment.

The spindle pulley is mounted on precision type ball bearings, fitted above and below the pulley so that no driving torque is transmitted directly to the spindle.

The table-raising screw is full ball bearing and is actuated by machine-cut steel screw and machine-cut steel gears. The raising crank is pivoted in its shaft and can be turned with the handle toward the inside to protect it from being bumped and broken. Three ball thrust bearings make for easy operation. When the raising screw is not used, the table fork is provided with an eccentric safety latch which prevents the table from dropping.

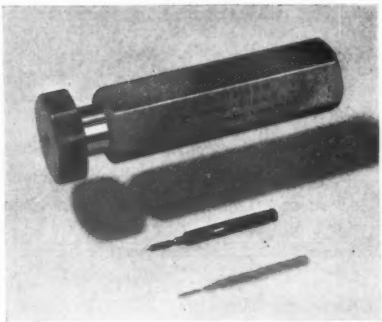
The foot feed has a 2" stroke and is operated by a gear meshing the feed pinion. The lever connecting the gear is ratchet-mounted so that the entire foot feed can be disengaged by turning a knurled nut. The foot treadle return is a torsion spring. This construction assures the maximum return pressure at the end of the stroke and does not have the overtravel experienced in the use of counterweights.

An interesting catalog describing and illustrating this new line may be had upon request to the Buffalo Forge Company, Buffalo, New York, for Bulletin TD-3123.



Floor drill with foot feed and table-raising screw.

Perfects Thread Grinding in Solid Carboloy



HAVING had much experience in grinding threads on tools made of solid Carboloy, it is natural that the Lincoln Park Tool & Gage Company should have made every effort to perfect the process. After much experimentation this company has recently completed two orders for plug gages for which Carboloy in solid form was used and the threads on which were ground to gage limit accuracy.

The illustration shows two thread plug gages which are representative of the two orders. The large gage was manufactured for a well known camera manufacturer for use in gaging the threads in a camera shutter case. The threaded portion is a shell of Carboloy brazed to a steel shank. The diameter of this gage is 37-4 mm. (1½ inches), with 50 pitch threads. The small gage is of ⅛" diameter and is now being used for gaging threads by a large business equipment manufacturer. The threaded portion of this gage is solid Carboloy and is butt brazed to a standard gage shank. It has 44 pitch threads.

This company guarantees that any degree of accuracy which can be secured in thread grinding in steel can be equalled in grinding threads in Carboloy.

More complete information may be had by writing Dept. TD, Lincoln Park Tool & Gage Company, Lincoln Park, Mich.

Columbia TOOL STEEL

A Company buying Columbia tool steels is paying a true compliment to its men.

The care and attention given in manufacturing is worthy of the user's best workmanship.

It pays to use Good Tool Steel

COLUMBIA TOOL STEEL COMPANY
GENERAL OFFICES AND WORKS
410 EAST 14TH. STREET • CHICAGO HEIGHTS, ILL.

HANDEE
TOOL OF 1001 USES

The wonder tool that is effecting such revolutionary savings in making and repairing tools, jigs, dies, etc.

Used also to repair hard-to-get-at places on machinery without removing the part. No shop can afford to be without the Handee.

Grinds
Drills
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SAVES HOURS OF TEDIOUS WORK

Uses 200 different accessories instantly interchangeable in easy-working chuck. Take anywhere, plug in AC or DC socket, 110 volts.

STANDARD MODEL

Weighs 1 pound. 13,000 r.p.m. $10.75 postpaid with 3 Accessories.

DE LUXE MODEL

Finest, smoothest, most powerful tool for its type and weight, 12 ounces. 25,000 r.p.m. $18.50 postpaid with 6 Accessories.

Order Either Model on 10-Days Money-back Trial
Catalog Free.

CHICAGO WHEEL & MFG. CO.
1101 W. Monroe St., Dept. BZ, Chicago, U.S.A.

TDM-7

( )Send Catalog. ( )De Luxe Model. ( )Standard. ( )C.O.D.

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Address .....

When you order or write about products described in TDM PROGRESS please mention the publication.

The Catalog Review

Brief descriptions of current industrial literature including technical booklets and bulletins, catalogs and circulars. All may be had upon request, without charge. . . . Please use identification numbers.

STANDARD FIXTURE AND FIXTURE LOCKS.—An amply illustrated loose-leaf catalog describing Siewek rapid clamping drill jigs, standard fixtures and fixture locks. Described as fast, accurate and positive these fixtures are designed with ample loading, chip and lubricating clearance. They have large wearing surfaces to withstand hard usage and maintain accuracy. Two types are described, the rack and pinion and spring types. Blue print details and tabulated dimensions accompany the illustrations of each type from the Junior spring jigs for use on small and delicate work to the large size rack and pinion types. Also included are three and four post jigs and a type for two-way drilling. Siewek fixture locks assure positive locking at any point within the travel of the handle, there being no back lash and they do not release under chatter. By reversing the inner drive assembly these locks may be adapted for right or left hand use. Write the Siewek Tool Company, Ferndale, Michigan, for TD-501.

WORK DONE ON THE BLANCHARD.—Under this title are assembled more than 100 actual surface grinding case records made in both Tool and Die and Production shops. In most instances a photograph shows the method actually employed and a description thereof. Also, there is usually a line-drawing of the product with its dimensions, and what is even more important, the grinding specifications and actual production attained or time required, as the case may be. In order, each of the four standard type Blanchard grinders are briefly described. The smallest with 10-inch wheel and 16-inch magnetic chuck is suitable for the tool room and for production grinding of small size parts and products. This machine is particularly adapted to the safe and rapid sharpening of punches and dies of hardened steel as well as such production items as valve tappet rollers, sewing machine rods, reamer blades, compressor parts and timing gears. One interesting record is that of the grinding of cutter teeth and tool bits made of a non-magnetic material; wax matrixes and special fixtures are used for chucking. The ease of grinding parallel sides of die shoes accurately, die sections which require the removal of ¼ to ½ inch of stock, grinding the parallel sides of die sections and die blocks, and bases and stripper plates; the resharpening of blanking dies, grinding of tool steel blocks for progressive dies, and the many parts of a compound blanking die are illustrated and described with the time required in each instance. To enable production manufacturers to compare their grinding methods and speed there are also many case records. Materials from cast iron to high speed steel are included. The one and two-wheel Blanchard automatic and the Dual automatic surface grinders are described and their capacities carefully illustrated. Write The Blanchard Machine Company, 66 State Street, Cambridge, Massachusetts, for TD-502.

TEMPERING AND DRAWING FURNACES.—A new catalog which illustrates and describes standard Despatch convected air tempering and drawing furnaces in detail. Presents in an interesting manner the achievements of Despatch engineering. Uniformity, high speed, control accuracy, flexibility, safety, and low initial and operating costs are a few of the many features discussed. Very little time is required

to bring a Despatch furnace from room temperature up to the desired operating temperature. There are no long waits or delays when changing the tempering or drawing temperature such as are experienced when using salt or oil baths. These quick changes of temperature are ideal for the jobbing shop because it means better customer service, and a greater operating profit. Standard type furnaces are designed for two operating ranges. The Despatch D type may be operated from 300° to 800° F. The Despatch DT type furnaces may be operated from 300° to 1250° F. Many instances have been reported where these furnaces have been successfully operated at temperatures from 180° F. up to 1250° F. which is an extremely wide operating range. Convected Air furnaces for tempering and drawing Dies, Tools and kindred parts are illustrated and their construction described in complete detail. Write Despatch Oven Company, 622 Ninth Street, S.E., Minneapolis, Minnesota, for TD-503.

Intricate

PRECISION MACHINES

• 25 years experience and a perfectly balanced plant enable us to build all kinds economically.

CARBOLOY TOOLS and DIES

We design and manufacture all types. Descriptive literature on request. May we quote you on your requirements?

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JIGS AND FIXTURES DESIGNED AND PRECISION-BUILT

We guarantee our products to meet every specification.

LYONS MACHINE COMPANY

5601 Tillman Ave. Cleveland, Ohio
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DARWIN'S

Cobaltcrom

prk 33

• air-hardening
• non-deforming
• alloy steel for

REMARKABLE WEAR RESISTANCE

Unsurpassed Quantity Production from Tools, Broaches, Shear Blades, Slitting Cutters, Punches and Dies for blanking, stamping, drawing, cutting, trimming, hot and cold forming, heading, swaging, thread rolling, ball making, wire drawing when made of

PRK 33 STEEL

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What To Expect From PRK 33 . . . Simplicity of heat treatment with practically no shrinkage or deformation; much longer service before regrinding becomes necessary; from dies, no "pick up" and a finer finish; lower final product cost.

Try PRK 33

AND BE CONVINCED

PRK 33 Welding Rods have no porous surfaces and do not flake. Frequently surpass even higher priced rods.

Write for descriptive circulars.

DARWIN & MILNER, Inc.

1258-64 West 4th Street Cleveland, Ohio

Makers of

High-Speed, Carbon & Alloy Steels in Bars, Forgings and Castings

When you order or write about products described in TDM PROGRESS please mention the publication.

Master Collet Designed On a New Principle

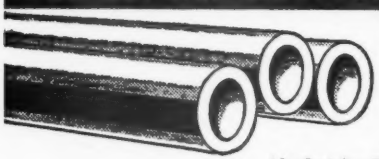
AN entirely new principle of collet design has been developed by the Modern Collet and Machine Company. The distinctive features of this new collet, known as the Martin Master Collet, are that it offers definite savings in initial costs and also effects unusual production economy.

The two principal objections to the use of master collets in the past have been the loosening of pad screws, sometimes even to such an extent that the pads would drop entirely out of the collet, and also the fact that it took considerably more time to change from one size to another than when solid collets were used. It is claimed that the new Martin Master Collet eliminates both objections.

By reason of its special construction, with the pad screws as integral parts of locking wedges which fit tightly into the end of the collet, the pads cannot loosen. When it is necessary to change the pads, a few turns of the wedge screws, with the collet still in operating position in the machine, permits quick removal. Instead of several hours to change collet size, the Martin Master Collet can be converted to any new size in a few seconds.

Another important feature of this new collet is that the pads and the body of the collet are made of different steels and heat-treated separately. The pads are made of specially selected wear-resisting steel and are heat-treated to a hardness far exceeding that of the body. The body is made to offer the utmost in both toughness and resiliency throughout its entire length. Additional information may be had upon request to the Modern Collet & Machine Company, Ecorse, Michigan, for Circular TD.

OIL HARDENING TOOL STEEL TUBING



Substantially reduces labor costs by eliminating the expensive procedure of drilling from the solid.

BISCO TOOL STEEL TUBING is a fine grade tool steel in tubular form available in sizes up to 14" diameter and 2" wall thickness; other sizes to your specification.

THE BISSETT STEEL COMPANY

947 E. 67th St. Cleveland, Ohio

1036 W. Lake St. Chicago, Ill. 367 Main St. Buffalo, N. Y

Also Stainless Tubes, Mechanical Tubes, Aircraft Tubes, Pressure Tubes

THE GEO. H. PORTER STEEL TREATING CO.

Tool Work Our Specialty

- *Heat Treating*
- *Annealing*
- *Carburizing*
- *Case Hardening*
- *Sand Blasting*

1225 Marquette St. Tel. HEnderson 6601 Cleveland, Ohio

Write or phone for our copyrighted Hardness Conversion Chart

When you order or write about products described in TDM PROGRESS please mention the publication.

Buy With Confidence

ABRASIVE PAPER AND CLOTH
Carborundum Co., Niagara Falls, N. Y.

AIR CONDITIONING APPARATUS
Buffalo Forge Co., 477 Broadway, Buffalo, N. Y.

ASSEMBLING MACHINES—Automatic
Sommer & Adams Co., The, 18511 Euclid Ave., Cleveland, Ohio.

BARS—Rolled Composite
Forging and Casting Corp., Ferndale (Detroit), Michigan.

BENDING MACHINES—Special
McKinney Tool & Mfg. Co., The, 1688 Arabella Rd., Cleveland, Ohio.

BENDING MACHINES—Angle Iron
Buffalo Forge Co., 477 Broadway, Buffalo, N. Y.

BOLTS—Stripper
Danly Machine Specialties, Inc., 2121 So. 52nd Ave., Chicago, Ill.

BORING HEAD
F. A. Maxwell Co., 310 Broadway, Bedford, Ohio.

BUSHINGS—Die
Acme Industrial Co., 206 No. Laflin St., Chicago, Ill.
Danly Machine Specialties, Inc., 2121 So. 52nd Ave., Chicago, Ill.

BUSHINGS—Drill Jig
Acme Industrial Co., 206 No. Laflin St., Chicago, Ill.
Colonial Bushings, Inc., 147 Jos. Campau Ave., Detroit, Mich.

CASTINGS— Nitri-Cast-Iron, Air and Oil Hardening Tool Steel Cast to Shape
Forgings & Casting Corp., The, Ferndale (Detroit), Mich.

CASTINGS—Strenes Alloy
Advance Foundry Co., 100 Parnell Ave., Dayton, Ohio.

CHROME PLATING—Dies and Machine Parts, New and Worn
Master Chrome Service, Inc., 5611 Herman Ave., N.W., Cleveland, Ohio.

CLAMPS—Die
Danly Machine Specialties, Inc., 2121 So. 52nd Ave., Chicago, Ill.

CLAMPS—Toggle
Detroit Stamping Co., 3443 West Fort St., Detroit, Mich.

CONTOUR METAL-WORKING MACHINES
Continental Machine Specialties, 1301 S. Washington Ave., Minneapolis, Minn.

COUNTERBORES
Putnam Tool Co., 2985 Charlevoix Ave., Detroit, Mich.

CRANKSHAFTS—Heat Treated for Presses
Enterprise Machine Parts Corp., 2731 Jerome Ave., Detroit, Mich.

CUT-OFF WHEELS
Carborundum Co., Niagara Falls, N. Y.

CUTTERS—Milling
Putnam Tool Co., 2985 Charlevoix, Detroit, Mich.
Weldon Tool Co., The, 3000 Woodhill Rd., Cleveland, Ohio.

CUTTER GRINDERS—Universal and Standard
H. P. Preis Engraving Machine Co., 155-157 Summit St., Newark, N. J.

CUTTING MACHINES—Hand & Power
Buffalo Forge Co., 477 Broadway, Buffalo, N. Y.

DIAMOND STONES
Carborundum Co., Niagara Falls, N. Y.

DIAMOND WHEELS
Carborundum Co., Niagara Falls, N. Y.

● **This directory of products lists for ready reference the names of manufacturers and dealers whose sales to Tool·Die·Machine PROGRESS readers have established them as dependable in every sense of the word. They merit your consideration.**

● **Complete information about any product may be had upon request made to the firm listed or to us.**

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DIE CASTING MACHINES
Phoenix Ice Machine Co., The, 2711 Church Ave., Cleveland, Ohio.

DIE MAKERS SUPPLIES
Acme Industrial Co., 206 No. Laflin St., Chicago, Ill.
Danly Machine Specialties, Inc., 2121 So. 52nd Ave., Chicago, Ill.

DIE MAKING MACHINES
Continental Machine Specialties, Inc., 1301 Wash. Ave., Minneapolis, Minn.
Grob Brothers, Grafton, Wis.

DIE AND MOLD COPYING MACHINES—Three Dimensional
H. P. Preis Engraving Machine Co., 155-157 Summit St., Newark, N. J.

DIE SECTIONS—Composite Steel
Forging and Casting Corp., Ferndale (Detroit), Michigan.

DIE SECTIONS—Forged
Ajax Steel and Forge Co., 205 Adair St., Detroit, Mich.
Lake Erie Forge & Machine Co., 1528 University Rd., Cleveland, Ohio

DIE SETS
Danly Machine Specialties, Inc., 2121 So. 52nd Ave., Chicago, Ill.

DOWEL PINS
Acme Industrial Co., 206 No. Laflin St., Chicago, Ill.
Danly Machine Specialties, Inc., 2121 So. 52nd Ave., Chicago, Ill.

DRESSING STICKS
Carborundum Co., Niagara Falls, N. Y.

DRILLS
Chicago-Latrobe Twist Drill Works, 100 So. Jefferson, Chicago, Ill.

DRILLING MACHINES—Automatic
Sommer & Adams Co., The, 18511 Euclid Ave., Cleveland, Ohio.

DRILL JIG—Universal
Hartford Special Machinery Co., Hartford, Conn.

DRILL JIG BUSHINGS
Acme Industrial Co., 206 No. Laflin St., Chicago, Ill.
Colonial Bushings, Inc., 145 Jos Campau St., Detroit, Mich.

DRILL PRESSES—Single & Multiple Spindle
Buffalo Forge Co., 477 Broadway, Buffalo, N. Y.

ELEVATING TABLES—Portable
Hamilton Tool Co., The, 222 North B Street, Hamilton, Ohio.

END MILLS
Putnam Tool Co., 2985 Charlevoix, Detroit, Mich.
Weldon Tool Co., The, 3000 Woodhill Rd., Cleveland, Ohio.

ENGRAVING MACHINE — Pantographic
H. P. Preis Engraving Machine Co., 155-157 Summit St., Newark, N. J.

FILES—Hand
Grobet File Corp. of America, 3 Park Place, New York, N. Y.

FILES—Rotary
Grobet File Corp. of America, 3 Park Place, New York, N. Y.
Hamilton Tool Co., The, 222 North B Street, Hamilton, Ohio.

FILING MACHINES—Continuous
Continental Machine Specialties, Inc., 1301 Washington Ave., S., Minneapolis, Minn.
Grob Brothers, Grafton, Wis.

FORGINGS—General
Ajax Steel & Forge Co., 205 Adair St., Detroit, Mich.
Lake Erie Forge & Machine Co., 1528 University Rd., Cleveland, Ohio.

FORGINGS—Water and Oil Hardening, High Speed, Special Alloy, Stainless and S.A.E. Steel
Forging and Casting Corp., Ferndale (Detroit), Michigan.

FORM TOOLS—For Screw Machines
Weldon Tool Co., 3000 Woodhill Rd., Cleveland, Ohio.

GAGES—Standard
Lincoln Park Tool & Gage Co., 1721 Ferris Ave., Lincoln Park, Mich.

GAGE BLOCKS
Ford Motor Co., Johansson Div., Dearborn, Mich.

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Boyar-Schultz Corp., 2114 Walnut Street, Chicago, Ill.
Koestlin Tool & Die Corp., 3601 Humboldt Ave., Detroit, Mich.

GRINDER—Utility
Maxwell Company, F. A., 310 Broadway, Bedford, Ohio.

GRINDING ATTACHMENTS — For Sharpening Cutting Tools
Weldon Tool Co., 3000 Woodhill Rd., Cleveland, Ohio.

GRINDING & LAPPING — Precision
Acme Industrial Co., 206 No. Laflin St., Chicago, Ill.

GRINDING MACHINES
Safety Grinding Wheel & Mach. Co., The, Springfield, Ohio.

GRINDING SPINDLES—Motorized
Majestic Tool & Mfg. Co., 2948 Woodbridge St., E., Detroit, Mich.

GRINDING WHEELS
Carborundum Company, The, Niagara Falls, New York.
Safety Grinding Wheel & Machine Co., The, Springfield, Ohio.

GRINDING WHEEL DRESSERS
Royal Grinding Wheel Dresser Co., Box B., Royal Oak, Mich.
Vinco Tool Co., 7352 Central Ave., Detroit, Mich.

GUIDE PINS
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Danly Machine Specialties, Inc., 2121 So. 52nd Ave., Chicago, Ill.

HONING STICKS
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JIG BORING—Contract
Lyons Machine Company, 5601 Tillman Ave., Cleveland, Ohio.
Precision Boring Co., 2900 E. Vernor Highway, Detroit, Michigan.
Swiss Boring Co., 3916 Vermont Ave., Detroit, Mich.

LAPS—Copper Head Expansion
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LAYOUT FLUID — For Dies, Templates
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Acme Industrial Co., 206 No. Laflin St., Chicago, Ill.

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J. Zagora Machine & Parts Co., 1231 Mint Street, Charlotte, No. Carolina.

MACHINE REBUILDING
Enterprise Machine Parts Corp., 2731 Jerome Avenue, Detroit, Mich.

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Brett Machinery Co., One N. Crawford Ave., Chicago, Ill.

MAGNETIC SINE TABLE
Omer E. Robbins Co., 637 Mt. Elliott Ave., Detroit, Mich.

MILLING MACHINES—Continuous
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MILLING MACHINE—Universal
H. P. Preis Engraving Machine Co., 155-157 Summit St., Newark, N. J.

MOTOR DRIVES—Individual
Berkeley Engineering Co., 1379 East 17th Street, Cleveland, Ohio.

PARALLELS
Ford Motor Co., Johansson Div., Dearborn, Mich.

PANTOGRAPH MACHINES
H. P. Preis Engraving Machine Co., 155-157 Summit St., Newark, N. J.

POLISHING & BUFFING MACHINES —Automatic Continuous
Sommer & Adams Co., The, 18511 Euclid Ave., Cleveland Ohio.

POLISHING GRAIN—
Carborundum Co., Niagara Falls, N. Y.

PUNCHES—Standard & Interchangeable
Hovis Screwlock Co., 3129 Larned St., E., Detroit, Mich.

PUNCH PRESSES
Marshalltown Mfg. Co., 913 E. Nevada St., Marshalltown, Iowa.

REAMERS
Chicago-Latrobe Twist Drill Works, 100 So. Jefferson, Chicago, Ill.
Putnam Tool Co., 2985 Charlevoix Ave., Detroit, Mich.

REAMER—Self-centering Cylinder
Royal Oak Tool & Machine Co., 421 E., Fourth Street, Detroit, Mich.

REPAIR PARTS FOR MACHINERY
Enterprise Machine Parts Corp., 2731 Jerome Ave., Detroit, Mich.

RETAINERS—Punch & Die
Hovis Screwlock Co., 3129 Larned St., E., Detroit, Mich.

RIVETING MACHINES
Buffalo Forge Co., 477 Broadway, Buffalo, N. Y.

ROLLER DIE FORMING MACHINES
McKinney Tool & Mfg. Co., The, 1685 Arabella Rd., Cleveland, Ohio.

SALVAGE—Tool-Die & Machine Parts
Master Chrome Service, Inc., 5911 Herman Ave., N.W., Cleveland, Ohio.

SAND BLASTING
Porter Steel Treating Co., The Geo. H., 1225 Marquette St., Cleveland, Ohio.

SAW & SHEAR CUT-OFF MACH.—Automatic
McKinney Tool & Mfg. Co., The, 1685 Arabella Rd., Cleveland, Ohio.

SAWING MACHINES—Continuous
Continental Machine Specialties, Inc., 1301 So. Washington St., Minneapolis, Minn.

SAWING MACHINES—Open End
Grob Brothers, Grafton, Wis.

SCREW MACHINE PRODUCTS—Contract
Star Machine & Tool Co., 9320 Woodland Ave., Cleveland, Ohio.
Ulmer Co., The J. C., 1791 East 38th St., Cleveland, Ohio.

SCREW MACHINE PRODUCTS—Hardened & Ground
Acme Industrial Co., 206 No. Laflin St., Chicago, Illinois.

SCREWS—Socket Head
Danly Machine Specialties, Inc., 2121 So. 52nd Ave., Chicago, Ill.
Holo-Krome Screw Corp., The, Hartford, Conn.
Strong, Carlisle & Hammond Co., 1392 West Third St., Cleveland, Ohio.

SCRIBERS
Ford Motor Co., Johansson Div., Dearborn, Mich.

SHARPENING STONES
Carborundum Co., Niagara Falls, N. Y.

SHEARS—Bolt & Rivet—Automatic
Buffalo Forge Co., 477 Broadway, Buffalo, N. Y.

SINE BARS
Ford Motor Co., Johansson Div., Dearborn, Mich.

SPACERS—For Milling Machine Arbors
Detroit Stamping Co., 3443 West Fort St., Detroit, Mich.

SPACING FIXTURES
Hartford Special Machinery Co., Hartford, Conn.

SPRINGS—Die
Danly Machine Specialties, Inc., 2121 So. 52nd Ave., Chicago, Ill.

STAMPINGS
Barth Stamping & Mach. Works, W. 34th & Denison, Cleveland, Ohio.
Boehm Pressed Steel Co., The, 2225 West 63rd St., Cleveland, Ohio.
Davis Tool & Engineering Co., 6481 Epworth Blvd., Detroit, Mich.
Denning Mfg. Co., The, 1775-81 E. 87th St., Cleveland, Ohio.
Detroit Stamping Co., 3443 West Fort St., Detroit, Mich.
Modern Tool & Die Co., P. O. Box 2741, Cleveland, Ohio.
Rockford Die & Tool Wks., Inc., 1816 Seventeenth St., Rockford, Ill.
Star Machine & Tool Co., 9320 Woodland Ave., Cleveland, Ohio.
Star Tool & Die Works, 2522 24th St., Detroit, Mich.
Ulmer Co., The J. C., 1791 East 38th
Variety Machine & Stamping Co., The, 12695 Elmwood Ave., Cleveland, Ohio. St., Cleveland, Ohio.

STEEL—Alloy
Columbia Tool Steel Co., 410 East 14th St., Chicago Heights, Ill.
Darwin & Milner, Inc., 1258-64 West Fourth Street, Cleveland, Ohio.
Wheelock-Lovejoy & Co., Inc., 130 Sidney St., Cambridge, Mass.

STEEL—Carbon
Columbia Tool Steel Co., 410 East 14th St., Chicago Heights, Ill.
Darwin & Milner, Inc., 1258-64 West Fourth Street, Cleveland, Ohio.

STEEL—Chromium
Darwin & Milner, Inc., 1258-64 West Fourth St., Cleveland Ohio.

STEEL—"Cobalt"
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Columbia Tool Steel Co., 410 East 14th Street, Chicago Heights, Ill.
Darwin & Milner, Inc., 1258-64 West 4th St., Cleveland, Ohio.

STEEL—Stainless
Ajax Steel & Forge Co., 205 Adair St., Detroit, Mich.

STEEL—Tool & Die
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Darwin & Milner, Inc., 1258-64 West 4th St., Cleveland, Ohio.
Wheelock-Lovejoy & Co., Inc., 130 Sidney St., Cambridge, Mass.

STEEL PLATE—Rough or Machined Torch Cut Shapes
Danly Machine Specialties, Inc., 2121 So. 52nd Ave., Chicago, Ill.

STEEL TREATING—Hardening
Porter Steel Treating Co., The Geo. H., 1225 Marquette St., Cleveland, Ohio.

STRAIGHT EDGES
Ford Motor Co., Johansson Div., Dearborn, Mass.

STRAIGHTENING MACHINES
Buffalo Forge Co., 477 Broadway, Buffalo, N. Y.

TAPPING MACHINES
Buffalo Forge Co., 477 Broadway, Buffalo, N. Y.

TOOLS—Carboloy
Lyons Machine Co., 5601 Tilliman Ave., Cleveland, Ohio.

TOOL CHESTS
Gerstner Tool Chests, 56 Columbia St., Dayton, Ohio.

TOOL HEAD—Universal
Precision Tool Co., The, Bridgeport, Conn.

TOOL HOLDERS
Weldon Tool Co., The, 3000 Woodhill Rd., Cleveland, Ohio.

TUBING—Tool Steel
Bissett Steel Co., The, 947 E. 67th St., Cleveland, Ohio.

VENTILATING APPARATUS
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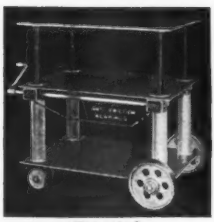

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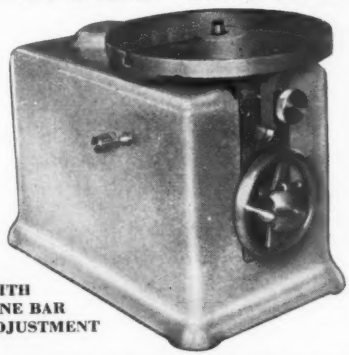

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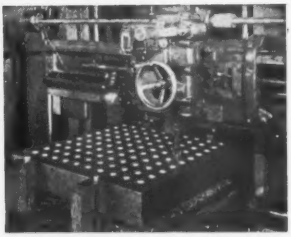

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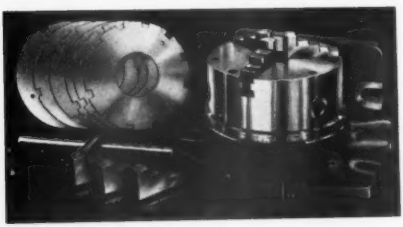

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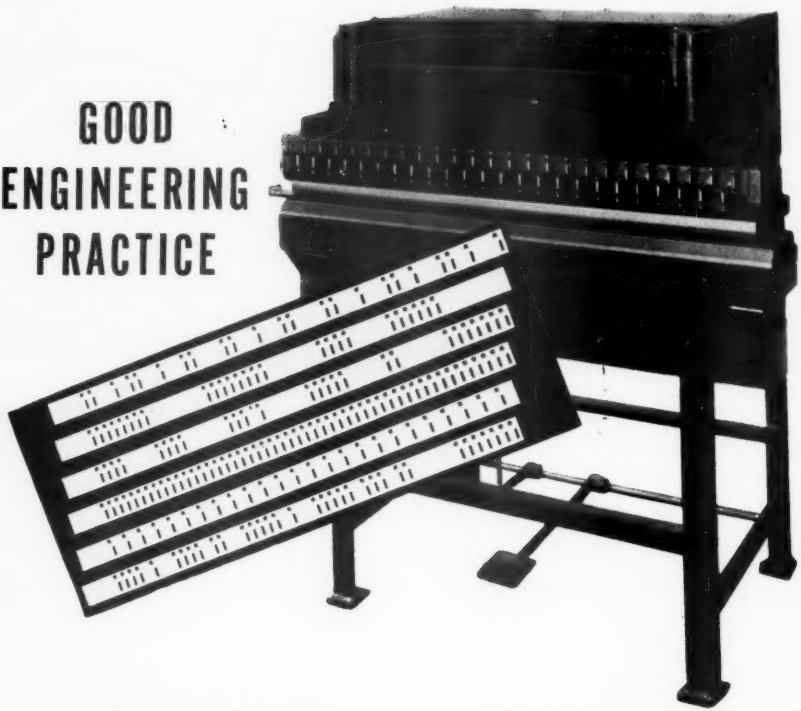

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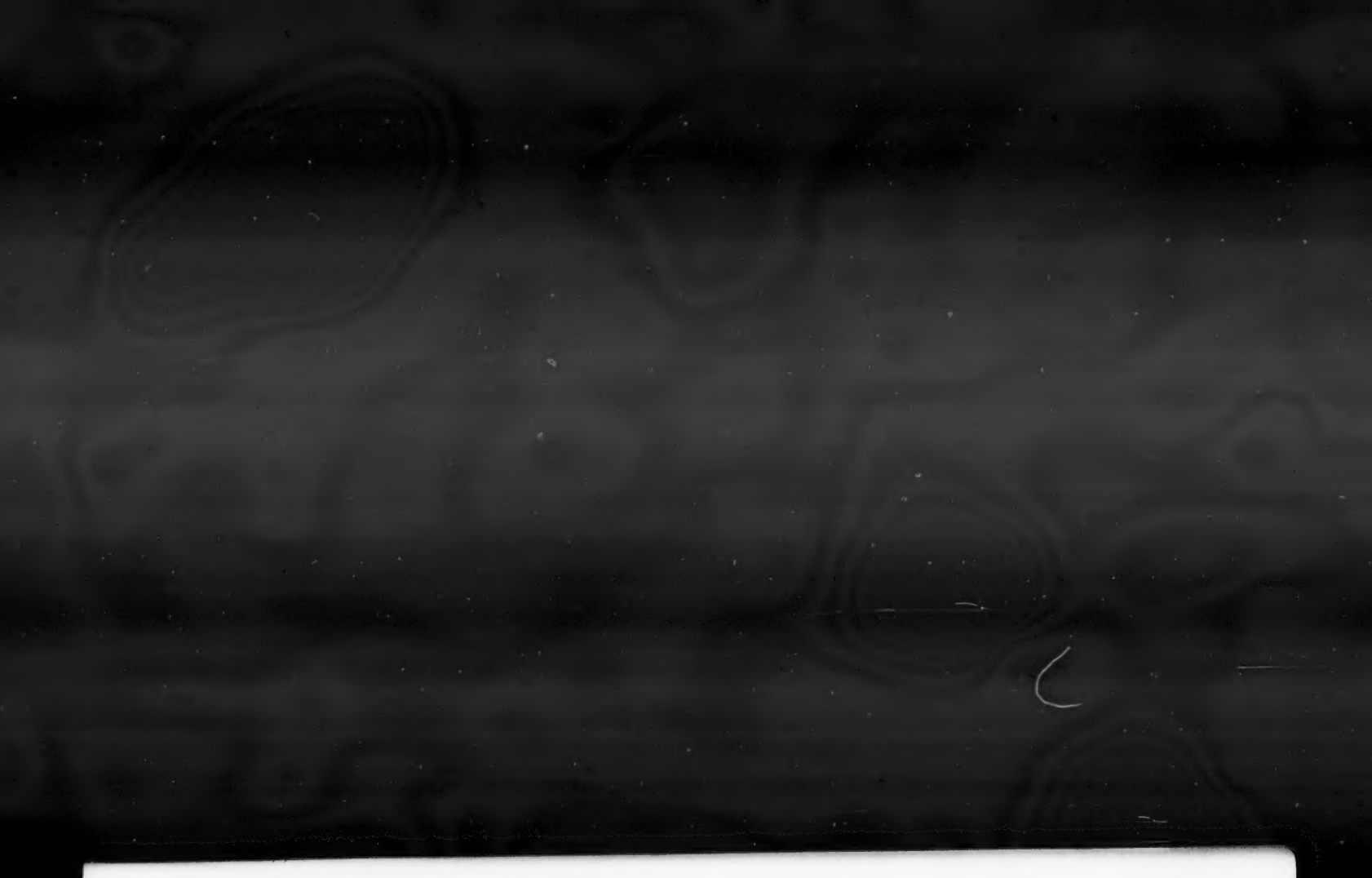
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